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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,782	12/01/2003	Mahesh Sambasivam	42P16313	3844
7590 04/01/2005 Blakely, Sokoloff, Taylor & Zafman LLP Suite 101 5285 S.W. Meadows Road Lake Oswego, OR 97035			EXAMINER PERT, EVAN T	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/725,782

Applicant(s)

SAMBASIVAM ET AL.

Examiner

Evan Pert

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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### ***Drawings***

1. The numeral "190" is omitted from the drawings.

At [0051], the specification reads "intermediate microelectronic package 190, as shown in FIG. 15," yet the numeral "190" was seemingly inadvertently omitted as was intended to appear in Fig. 15, such as with an arrow delineating the entire structure of Fig. 15. Correction is required by deletion of the reference numeral in the text or by an amended Fig. 15.

### ***Specification***

2. The specification includes informalities:

- The abstract is grammatically improper (i.e. "...exposing any the radiation material...").
- At p. 2, line 5, in [0004], "FIG. 18" should read --FIG. 19--.
- At p. 3, line 10, in [0007], "FIG. 19" should read --FIG. 23--.
- At p. 8, line 5, in [0037], "solders ball" should read --solder balls--.
- At p. 13, line 8, in [0051], "FIG. 13" should read --FIG. 16--.

Correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 13-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Mitani et al. (US 5,982,041).

Regarding claim 13, the Mitani et al. reference discloses a method of fabricating a microelectronic package (e.g. title), comprising: providing a substrate (e.g. 8) having a surface (e.g. top surface) and a plurality of lands (e.g. the inherent "land" on copper interconnect 9) disposed on said surface, providing a microelectronic die (e.g. 1) having an active surface (i.e. facing up in cover figure), an opposing back surface (i.e. touching adhesive 3), and at least one land disposed on said microelectronic die active surface (e.g. bonding pad "land" 4); attaching said microelectronic die (1) back surface to said substrate (8) active surface (i.e. surface with components) with a radiation curable adhesive material (i.e. 3 per col. 3, lines 60-63); and exposing said substrate and said microelectronic die to radiation (e.g. col. 17, lines 26-51).

Regarding claim 14, the attaching of microelectronic die (1) back surface to substrate (8) surface comprises disposing said radiation curable adhesive material on said substrate active surface and placing said microelectronic die back surface to said radiation curable adhesive material (e.g. col. 17, lines 26-51).

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Regarding claim 15, the attaching of microelectronic die (1) back surface to substrate (8) surface comprises disposing an ultraviolet radiation curable adhesive material (3) on said substrate active surface and (8) placing said microelectronic die (1) back surface to said ultraviolet radiation curable adhesive material (3) [e.g. col. 3, lines 60-63; col. 17, lines 26-51].

Regarding claim 16, the exposing said substrate and said microelectronic die to UV radiation "is preferably carried out immediately after the semiconductor chip 1 has been placed on substrate 8" [col. 17, lines 48-51], and therefore the methodology can reasonably be said to anticipate "substantially simultaneously," in the context of applicant's written description in that the UV need not be started before the die is attached in applicant's claimed invention, only quick enough to prevent "bleeding." (*i.e.* "bleed-out" )

Regarding claim 17, the exposing the substrate (8) and said microelectronic die (1) to radiation comprises exposing said substrate and said microelectronic die to ultraviolet radiation with a UV curable adhesive in between die 1 and active substrate 8 (e.g. col. 17, lines 43-46). In fact, the Mitani et al. reference states "UV is preferred practice" [col. 16, lines 8-9].

Regarding claim 18, while not limited by the Mitani et al. reference, the adhesive material in a "preferred embodiment" is "silicone" [col. 4, lines 12-14].

Regarding claim 19, "UV is preferred practice" [col. 16, lines 8-9].

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Regarding claim 20, at least one wirebond (e.g. end of 6 on 4) is attached to be extending between at least one land on said active surface microelectronic device (i.e. landing pad of copper interconnect 9 on active side of electronic device of substrate 8) and at least one wirebond land on said substrate (i.e. wirebond land on copper interconnect 9 on substrate 8).

5. Claims 1-3, 5-8 and 10 are rejected under 35 U.S.C. 102(a) as being anticipated by Baba et al. (US 6,582,993 B1).

Regarding claim 1, the Baba et al. reference discloses a method of fabricating a microelectronic package (i.e. underfilling as part of packaging a semiconductor die), comprising: providing a substrate (72); providing a microelectronic die (82); disposing a radiation curable material between said microelectronic die and said substrate surface (e.g. fluid 88 is UV curable underfill per col. 13, line 35 to col. 14, line 15); exposing said substrate and said microelectronic die to radiation (e.g. from UV light source 76).

Regarding claim 2, exposing the die 82 to radiation (UV from 76) comprises exposing substrate 72 and microelectronic die 82 to UV substantially simultaneously with said disposing said radiation curable material between said microelectronic die and said substrate surface (right side cover figure with text at col. 14 to line 15, for example).

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Regarding claims 3, 5, 6, 7, 8 and 10, the limitations are clearly anticipated by the right side cover figure with explanatory text at cols. 13-14 because the the bumps 84 correspond to the lands 83 and underfill 88 is UV curable and this underfill is flowed in between the die 82 and the substrate 72 while the UV light source 76 is in operation, which means that the “attaching” and the “UV radiation” don’t just occur “substantially simultaneously,” they occur “simultaneously” [see claim 3].

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al., as applied to claims 3 and 8 above, and further in view of either Akram et al. (US 6,214,635 B1) or the “Technical Paper” to Swanson entitled “Advances in Photo Curing Adhesives and Coatings Lead to Process and Quality Benefits in Electronics Manufacturing,” downloaded from internet.

Baba et al. is silent about the composition of the “reaction resin” used as underfill and cured by UV radiation, yet Akram et al. and Swanson both suggest what one of ordinary of skill would know at the time of applicant’s claimed invention:

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Swanson for example, states that "for electronics applications, the systems are primarily based on acrylic and urethane chemistries (although light curing epoxies and silicones are known)" [p. 3 of 13].

Akram et al. explain that an underfill material is typically "epoxy" or an "acrylic resin" [col. 4, lines 30-34] when the underfill is UV curable [col. 5, lines 25-27].

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to have adopted a material from the group consisting of "epoxies, acrylates, silicones, urethane acrylates, cyanoacrylates, and bismaleimides," for the "resin" in Baba et al., motivated to use a UV curable "reaction resin" that is a suitable underfill to be UV cured in the invention of Baba et al..

One of ordinary skill in the art would have been motivated to adopt a UV-curable "epoxy," for example, because a UV-curable epoxy that is suitable as an underfill as taught by both Swanson and Akram et al., will also act as a suitable underfill "reaction resin" that is needed to react to UV light and act as an underfill material in Baba et al..

8. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al. as applied to claim 6 above, and further in view of applicant's admitted prior art [0002]-[0008] with Figs. 22-23.

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Baba et al. is silent about a second microelectronic device, such as a stacked chip, on the underfilled device (82). However, applicant's admitted prior art depicts the limitations of a second electronic device (i.e. a second chip) stacked [Fig. 22], having a bleeding problem in Fig. 23.

Baba et al.'s invention suggests a solution to the admitted prior art problem in Fig. 23 [col. 14, lines 3-15], so it would have been obvious to one of ordinary skill in the art at the time of claimed invention to adopt the underfill method of Baba et al. in the prior art underfill that bleeds out as seen in Fig. 23.

One of ordinary skill in the art would have been motivated to adopt the underfill process of Baba et al. to the admitted prior art Fig. 22 to solve the bleeding problem [col. 14, lines 3-15].

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Yang (US 6,759,307) is cited for disclosing admitted prior art arrangement Fig. 22 and that "UV curable acrylics and silicones is a type of die attach material "known in the art" [col. 6, lines 16-21].

Uchida (US 6,620,649 B2) is cited for disclosing use of UV-curable adhesives and underfill materials.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR-system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ETP  
March 28, 2005

  
**EVAN PERT**  
**PRIMARY EXAMINER**